

# **Interim Estimates of 2017–18 Seasonal Influenza Vaccine Effectiveness against Medically Attended Influenza from the US Flu VE Network**

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**For the US Flu VE Network**

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# US Flu VE Network sites and principal investigators

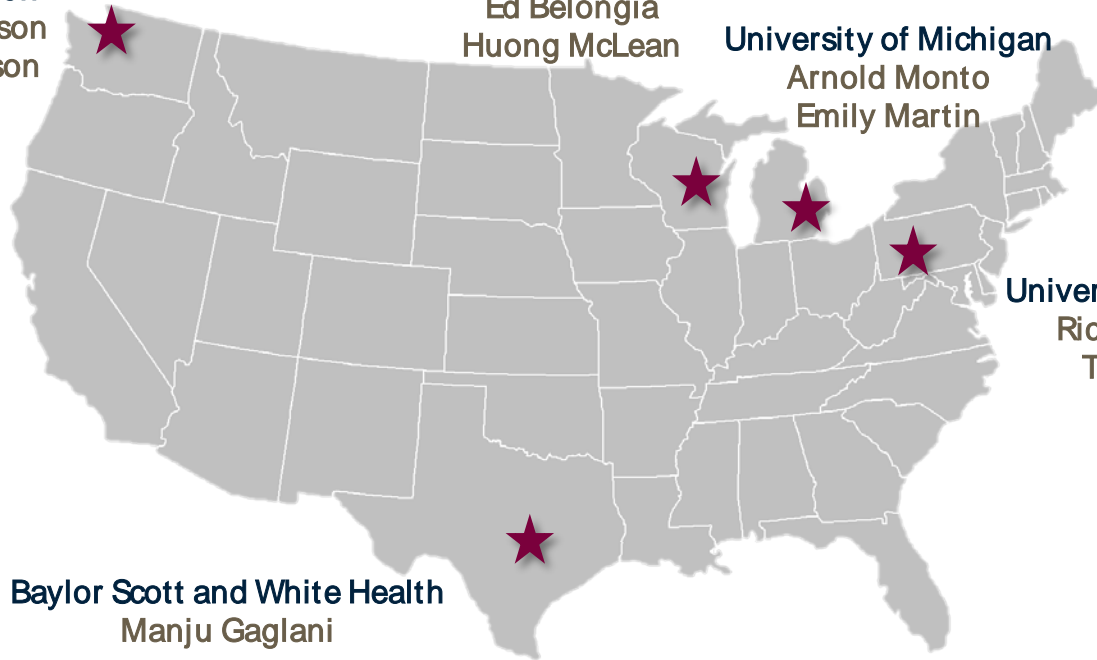
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# US Flu VE Network Methods

**Enrollees:** Outpatients aged  $\geq 6$  months with acute respiratory illness with cough  $\leq 7$  days duration

**Dates of enrollment:** November 2, 2017–February 3, 2018

**Design:** Test-negative design

- Comparing vaccination odds among influenza RT-PCR positive cases and RT-PCR negative controls
- Vaccination status: receipt of at least one dose of any 2017–18 seasonal flu vaccine according to medical records, immunization registries, and/or self-report

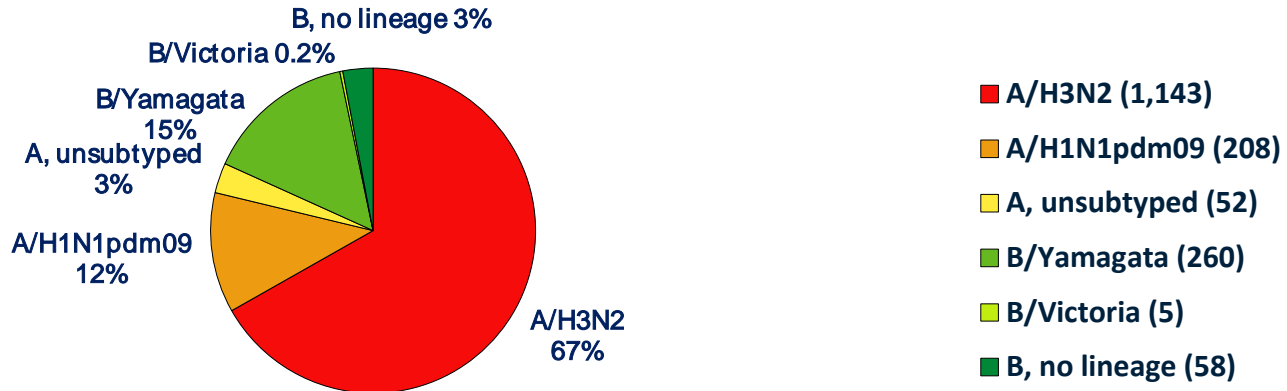
**Analysis:**  $VE = (1 - \text{adjusted OR}) \times 100\%$

- Adjustment for study site, age, self-rated general health status, race/Hispanic ethnicity, interval from onset to enrollment, and calendar time

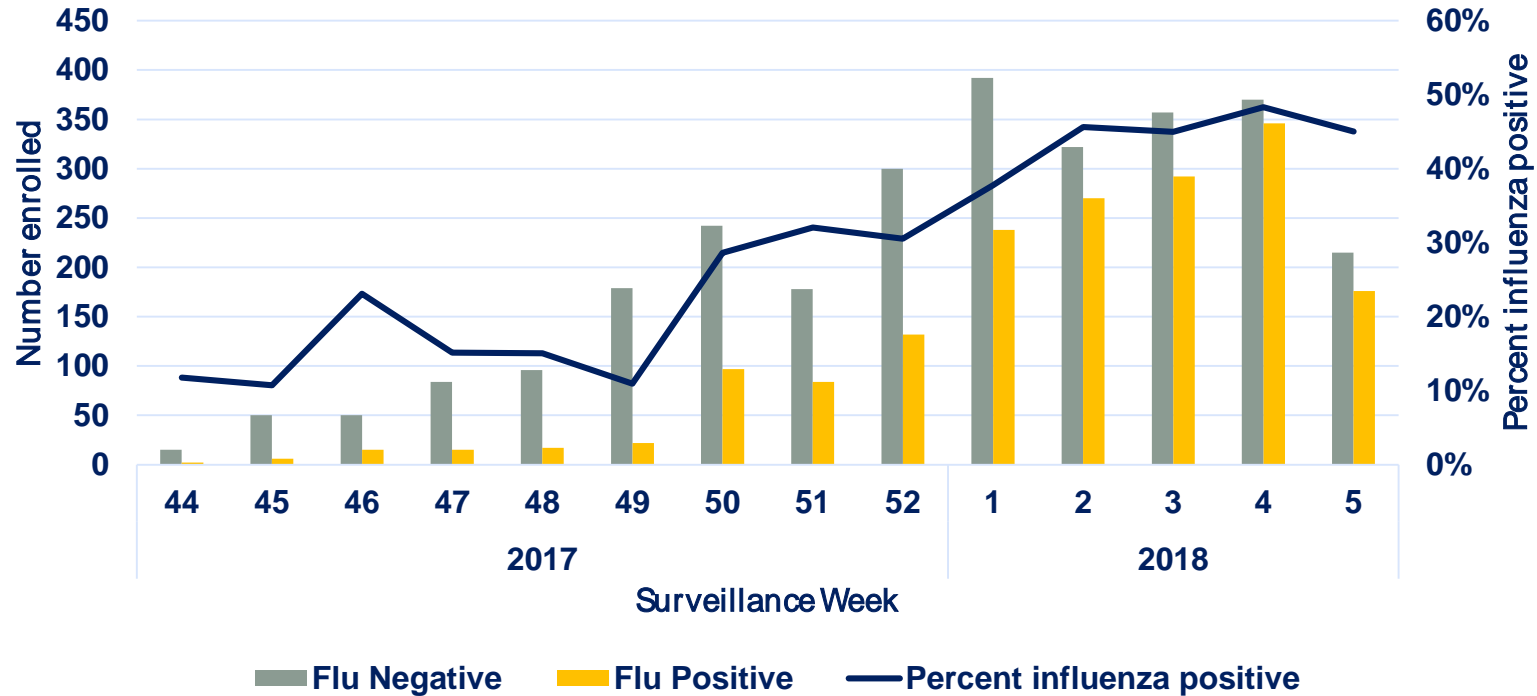
# Interim Results

- 4,562 enrolled from Nov 2, 2017–Feb 3, 2018 at 5 sites
- 1,712 (38%) influenza RT-PCR positive
- 2,850 (62%) influenza RT-PCR negative

## Cases enrolled by (sub)type, N=1,712



# Number of enrolled participants by influenza RT-PCR result and percent positivity by week of onset



Note: Week 5 only includes patients with completed laboratory tests and thus does not reflect all enrolled patients during that week across study sites.

# Interim adjusted vaccine effectiveness against medically attended influenza by age group, 2017–18

|                            | Influenza positive  |      | Influenza negative  |      | Vaccine Effectiveness |             |           |             |
|----------------------------|---------------------|------|---------------------|------|-----------------------|-------------|-----------|-------------|
|                            |                     |      |                     |      | Unadjusted            |             | Adjusted* |             |
| Any influenza A or B virus | N vaccinated /Total | (%)  | N vaccinated /Total | (%)  | VE %                  | 95% CI      | VE %      | 95% CI      |
| <b>Overall</b>             | 741/1712            | (43) | 1518/2850           | (53) | 33%                   | (24 to 41)  | 36%       | (27 to 44)  |
| <b>Age group (yrs)</b>     |                     |      |                     |      |                       |             |           |             |
| <b>6 mos–8</b>             | 127/359             | (35) | 408/739             | (55) | 56%                   | (42 to 66)  | 59%       | (44 to 69)  |
| <b>9–17</b>                | 100/288             | (35) | 104/300             | (35) | 0%                    | (-41 to 29) | 5%        | (-38 to 34) |
| <b>18–49</b>               | 198/561             | (35) | 444/989             | (45) | 33%                   | (17 to 46)  | 33%       | (16 to 47)  |
| <b>50–64</b>               | 159/288             | (55) | 277/454             | (61) | 21%                   | (-6 to 42)  | 17%       | (-15 to 40) |
| <b>≥65</b>                 | 157/216             | (73) | 285/368             | (78) | 23%                   | (-14 to 47) | 18%       | (-25 to 47) |

\* Multivariate logistic regression models adjusted for site, age, sex, race/ethnicity, self-rated general health status, interval from onset to enrollment, and calendar time.

# Interim adjusted vaccine effectiveness against medically attended influenza A(H3N2) by age group, 2017–18

|                                | Influenza positive     |      | Influenza negative     |      | Vaccine Effectiveness |             |            |                    |
|--------------------------------|------------------------|------|------------------------|------|-----------------------|-------------|------------|--------------------|
|                                |                        |      |                        |      | Unadjusted            |             | Adjusted*  |                    |
|                                | N vaccinated<br>/Total | (%)  | N vaccinated<br>/Total | (%)  | VE %                  | 95% CI      | VE %       | 95% CI             |
| <b><u>Influenza A/H3N2</u></b> |                        |      |                        |      |                       |             |            |                    |
| <b>Overall</b>                 | 530/1143               | (46) | 1518/2850              | (53) | 24%                   | (13 to 34)  | <b>25%</b> | <b>(13 to 36)</b>  |
| <b>Age group (yrs)</b>         |                        |      |                        |      |                       |             |            |                    |
| <b>6 mos–8</b>                 | 79/200                 | (40) | 408/739                | (55) | 47%                   | (27 to 61)  | <b>51%</b> | <b>(29 to 66)</b>  |
| <b>9–17</b>                    | 75/203                 | (37) | 104/300                | (35) | -10%                  | (-60 to 24) | <b>-8%</b> | <b>(-62 to 29)</b> |
| <b>18–49</b>                   | 155/395                | (39) | 444/989                | (45) | 21%                   | (-1 to 37)  | <b>20%</b> | <b>(-4 to 38)</b>  |
| <b>50–64</b>                   | 115/198                | (58) | 277/454                | (61) | 11%                   | (-24 to 37) | <b>12%</b> | <b>(-26 to 39)</b> |
| <b>≥65</b>                     | 106/147                | (72) | 285/368                | (78) | 25%                   | (-16 to 51) | <b>17%</b> | <b>(-35 to 49)</b> |

\* Multivariate logistic regression models adjusted for site, age, sex, race/ethnicity, self-rated general health status, interval from onset to enrollment, and calendar time.

# Interim adjusted vaccine effectiveness against medically attended influenza A(H1N1)pdm09 and B by age group, 2017–18

|                                     | Influenza positive  |      | Influenza negative  |      | Vaccine Effectiveness |             |           |             |
|-------------------------------------|---------------------|------|---------------------|------|-----------------------|-------------|-----------|-------------|
|                                     |                     |      |                     |      | Unadjusted            |             | Adjusted* |             |
|                                     | N vaccinated /Total | (%)  | N vaccinated /Total | (%)  | VE %                  | 95% CI      | VE %      | 95% CI      |
| <b><u>Influenza A/H1N1pdm09</u></b> |                     |      |                     |      |                       |             |           |             |
| Overall                             | 60/208              | (29) | 1518/2850           | (53) | 64                    | (52 to 74)  | 67        | (54 to 76)  |
| Age group (yrs)                     |                     |      |                     |      |                       |             |           |             |
| 6 mos–17                            | 22/105              | (21) | 512/1039            | (49) | 73                    | (56 to 83)  | 78        | (63 to 87)  |
| 18–64                               | 26/84               | (31) | 721/1443            | (50) | 55                    | (28 to 72)  | 51        | (20 to 70)  |
| ≥65                                 | 12/19               | (63) | 285/368             | (78) | 50                    | (-31 to 81) | 34        | (-96 to 78) |
| <b><u>Influenza B</u></b>           |                     |      |                     |      |                       |             |           |             |
| Overall                             | 132/323             | (41) | 1518/2850           | (53) | 39                    | (23 to 52)  | 42        | (25 to 56)  |
| Age group (yrs)                     |                     |      |                     |      |                       |             |           |             |
| 6 mos–17                            | 46/127              | (36) | 512/1039            | (49) | 42                    | (14 to 60)  | 36        | (1 to 58)   |
| 18–64                               | 53/151              | (35) | 721/1443            | (50) | 46                    | (23 to 62)  | 50        | (28 to 66)  |
| ≥65                                 | 33/45               | (73) | 285/368             | (78) | 20                    | (-62 to 60) | 25        | (-62 to 66) |

\* Multivariate logistic regression models adjusted for site, age, sex, race/ethnicity, self-rated general health status, interval from onset to enrollment, and calendar time.



# Summary

- Interim results for 2017–18 season (through February 3, 2018) indicate vaccination reduced influenza medically attended illness by 36%
  - 25% (13 to 36) VE against A(H3N2) for all ages
    - 51% (29 to 66) in children aged 6m – 8 years
    - No other age groups had statistically significant VE estimates
  - 67% (54 to 76) VE against A(H1N1)pdm09
  - 42% (25 to 56) VE against B (mostly B/Yamagata, not in IIV3)
- Final VE results will be shared at end of season
- Final VE used to calculate averted burden (cases, hospitalizations, deaths)
  - Vaccination averts thousands of hospitalizations each year—during 2014-15, 47,000 (11,000 – 144,000) influenza hospitalizations averted

# Understanding VE against A(H3N2) viruses

- Vaccine:
  - DoD VE studies: VE for IIV4 and cell-culture (ccIIV4) vaccines in active military and dependents (AFHSB and USAFSAM)
  - Comparative vaccine effectiveness (FDA and Centers for Medicare and Medicaid Services): Hospitalization/medically-attended influenza rates by vaccine type (ccIIV and IIV, SD, HD and adjuvanted vaccines)
- Related to the immune response to vaccine or prior infection:
  - Effects of repeat vaccination and birth cohort or age effects (US Flu VE)
  - Vaccine response by vaccine type, prior vaccination (serology)
- Virus: Sequencing of positive specimens using next-generation sequencing

# US Flu VE Network

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

